

XLIX.—*Contributions to the Ichthyology of Australia.* By JOHN RICHARDSON, M.D., F.R.S., &c., Inspector of Hospitals, Haslar.

[Continued from p. 182.]

BATRACHUS DIEMENSIS (*Le Sueur?*), Tasmanian Frog-fish.

No. 34. Mr. Gilbert's list.

MR. GILBERT says that "this fish is an inhabitant of the mud at the head of the harbour of Port Essington, where it may be frequently seen creeping over the surface when the tide has left. It is very difficult to capture, for on the slightest appearance of danger it plunges down instantaneously."

Not having at hand the journal of the Academy of Science of Philadelphia, in which M. Le Sueur describes the *Batrachus diemensis*, I am unable to affirm the correctness of the designation which I have given to Mr. Gilbert's specimen. The *diemensis* is quoted in the 'Histoire des Poissons' as a synonym of the *quadrispinis* of that work, and with this the Port Essington fish agrees in having two spines on the suboperculum similar to the opercular ones; but *quadrispinis* has three spines in the first dorsal, its markings are described as merely crowded dots on a pale ground, and nothing is said of the finely streaked and reticulated arrangement of the pale tint on the upper surface of the body, and in the axilla of the pectoral, which exists in Mr. Gilbert's fish. The figure of *Lophius dubius* in White's 'Voyage to Botany Bay,' which is referred by Cuvier to *Batrachus dussumieri*, is so bad, that the only mode of discovering what it was intended for is a careful comparison of all the species which frequent Port Jackson.

Teeth all very short, appearing conical and acute under the microscope, but to the naked eye forming villiform bands. The band is broadest at the symphysis of the lower jaw, but laterally and on the intermaxillaries it is reduced to a single, or at most a double row of teeth. On the vomer and palatine bones the dental stripe is three or four rows deep, and it widens posteriorly. The lower lip is fringed with short, thick filaments; there are a few on the maxillary; one small one projects from the membrane on each side of the snout over the limb of the intermaxillary, and about five somewhat larger ones mark out the edge of the preoperculum. The upper edge of the orbit is furnished with a short palmated filament, and there is a smaller simple one further back. One row of pores with tumid lips runs above the orbit, and another below it: they meet behind, pass on in a single line to the nape, and thence with a slight arching to the end of the soft dorsal. A second row commencing before the ventrals, runs under the pectoral to the end of the anal; a third one, not so crowded and less complete, may be detected on the middle of the side; and a few pores are scattered over the body. When

the skin is moistened it wrinkles, particularly behind the pectorals and on the upper part of the sides, forming many soft, forking and anastomosing ridges which enclose innumerable little pits, each of which is marked by a black spot, while the ridges have a pale yellowish brown colour. In drying the skin becomes quite even, and the site of the wrinkles on the top and sides of the body and head is occupied by a fine meshwork of yellowish lines. Towards the belly there appear merely dark specks scattered over the yellowish ground. There are also five or six large irregular dark blotches on the sides and back. The skin is scaleless.

RAYS:—B. 6; D. 2—18; A. 16; P. 20; C. 13; V. 1½.

The pectorals are oval. The first dorsal is represented by two warty points scarcely projecting above the skin: there is no vestige of a third spine. The soft dorsal, commencing a short way behind these points, has the free compressed tips of its rays covered with thick skin; its last ray is short, and may be merely a division of the one which precedes it. The same may be said of the last ray of the anal. The opercular spines are rather flat and obtuse, and, as in *quadrispinis*, the upper one is twice the length of the under one. The suboperculum is armed with two similar spines, and also by a third shorter one or rather angular point beneath them.

DIMENSIONS.		inches, lines.	
Length from upper lip to end of caudal fin		7	5
———— base of ditto		6	0
———— anus		4	7
———— gill-opening		2	3
Height at pectorals		1	8
Thickness at ditto		1	8
Length of pectorals		1	1
———— ventrals		1	5

LABRUS GOULDII (Nob.), Gould's Wrasse.

Sp. British Museum, No. 40, 12, 9, 62.

The 'Histoire des Poissons' contains descriptions of only four *Labri* of the Southern seas, viz. *L. pæcilopleura* of New Zealand, *L. ephippium* and *macrodontus* of Java, and *L. gayi* of Juan Fernandez. The British Museum possesses a fish brought from Western Australia by Mr. Gould, which appears to be nearly allied to *L. macrodontus*, but to differ in the number of the fin-rays as well as in some other particulars. The specimen consists of the dried skin of one side of the fish, and the bones of the head have been much cut away, so that the proper form of the profile cannot be exactly ascertained. No traces of the original colour remain, but Mr. Gould reports that it was an uniform olive in the recent fish. In the dentition this species approaches to the genus *Cossyphus*, but the fins are not so extensively scaly, there are no crenatures on the preoperculum, and the general aspect is dissimilar. It differs

in various characters from any of the *Cossyphi* described in the 'Histoire des Poissons.'

Head short and obtuse. Two long obtuse nearly cylindrical teeth stand near the symphysis of each jaw (in all four above and four below), followed by a series of nine short conical ones. The edges of the jaws are naked and crenated, with some small granular teeth bursting through. [Part of the upper jaw is concealed by the dried incurved lip. The vomer and palate bone are cut away.] There is no canine tooth at the angle of the mouth. The snout, under-jaw, sub-orbital and top of the head to the occiput, are naked. The cheek is covered by small, vertical-oval, remote, impressed scales, which form seven rows before the curve of the preoperculum, but diminish to two towards the temples, the scales at the same time increasing in size. The hinder edge of the preoperculum is free and quite smooth. The anterior border of the operculum is also smooth and is vertically striated; the rest of the bone is entirely scaly, so as to conceal its junction with the suboperculum: the scales form five rows, and increase in size towards the gill-opening. A row of still larger scales protects the suboperculum, and five rows of smaller ones, though not so small as those on the cheek, cover the interoperculum, the lower edge of this bone being smooth. The free edge of the gill-cover is rounded, its tip being formed by the rounded, scaleless, membranous lobe. The situation of the suprascapular bone is denoted by the peculiar form of the scales, and there is a patch of smaller scales on the temple, which does not reach to the top of the head. The scales of the body are large, there being forty in a longitudinal row, including two rows of smaller ones on the base of the caudal*. The lateral line is very slightly arched, and becomes quite straight under the end of the dorsal. It is formed by a raised tube on each scale, ending in a bushy cluster, the branches of which are not very distinct.

RAYS:—D. 11|10; A. 3|10; C. 14 $\frac{3}{5}$; P. 17; V. 1|5.

The spinous part of the dorsal is slightly arched and is lower than the articulated portion, which ends in a point formed by the penultimate and two preceding rays, the eighth soft ray being the longest. The spines are much compressed with thin edges and a round tip, except the three last, which are more cylindrical and acute. The membrane is notched behind each spine. The soft part of the anal resembles the corresponding portion of the dorsal: the spines are much wider and more thin and rounded at the ends than the dorsal ones; the membrane forms a broad edging to each spine. The caudal is moderately rounded. The pectoral is also rounded off. The ventral is pointed; its greatly compressed spine is shorter than the fifth soft ray, and has only half the length of the second and third rays, which are the longest.

* There are twenty or twenty-one scales in a vertical row, of which seven are above the lateral line. A few small scales exist on the base of the articulated portions of the dorsal and anal, but none on the spinous parts. The edges of the scales are rounded, thin and membranous.

DIMENSIONS.		inches.	lines.
Length from end of snout to end of caudal		38	6
———— base of caudal		35	6
———— anal fin		22	0
———— anus		20	6
———— ventral		13	0
———— dorsal		12	6
———— pectoral		10	3
———— edge of gill-cover		10	3
———— centre of eye		5	6
Height of first dorsal spine.....		1	6
———— fourth and fifth		2	2
———— ninth		1	6
———— eleventh		1	9
———— longest soft ray of dorsal		5	6
———— first anal spine		2	0
———— second ditto		2	3
———— third ditto		2	6
———— longest soft ray of anal		5	6
———— body about.....		12 or 13	0

LABRUS CYANODUS (Nob.), Azure-toothed Wrasse.

No. 16. Mr. Gilbert's list.

This wrasse bears the name of "ngurmin" among the Aborigines of Port Essington, and is very abundant in that harbour, where it inhabits deep water with a rocky bottom. The specimen was captured at Black Point. It seems to have the closest affinity with the *Labrus macrodontus* of Lacepède and *japonicus* of the 'Histoire des Poissons,' differing from them only in the arrangement of the shades of colour, in the want of a canine tooth at the angle of the mouth, and in the minor development of the bony edges of the upper and lower jaws.

The profile rises in a straight line from the upper lip, at an angle of 45° with the axis of the fish, and then curves abruptly to join the very slightly arched dorsal line. The curve of the belly is similar to that of the back, and the body, which is highest in the pectoral region, tapers from thence to the trunk of the tail, whose height is about one-third of that of the body. The length of the head measured to the tip of the gill-flap equals the height at the breast, and somewhat exceeds one-third of the length of the fish, excluding the caudal fin. The canine teeth, strong, curved, and of an azure blue colour, stand in a pair on each side of the symphysis of each jaw. In the upper jaw the outer or posterior tooth of each pair is comparatively short and small; in the lower jaw the corresponding tooth is as tall and strong as the one next the symphysis, from which it diverges by a lateral curve. The naked bony edges of the upper and lower jaws are thin, of a blue colour, and are armed with minute granular teeth; the upper ones, with the exception of one within the base of the canines, scarcely perceptible to the naked eye; the lower ones resembling crenatures of the bone, and amounting to about sixteen in number, the four next the angle of the mouth being

slightly larger than the rest. The eye is small, placed high up, and equidistant from the edge of the upper lip and tip of the gill-flap, but more remote from the under edge of the interoperculum. The anterior nasal orifice is incapable of admitting more than the point of a fine needle; the posterior one is larger and of an oval shape. There are seven rows of small roundish depressed scales on the cheek, not touching each other; they increase a little in size as they approach the temple, and the rows there are reduced to two. Five irregularly tiled vertical rows of larger scales cover the bony operculum and suboperculum, increasing in size as they recede from the preoperculum. The gill-cover ends in a projecting rounded thin membranous lobe, beneath which there is a conspicuous curved notch, formed by a narrowing of the suboperculum and the expansion of the very thin edge of the wide interoperculum. A single row of six small scales runs along the upper part of this bone, immediately beneath the edge of the preoperculum. The angle of the suboperculum is widely rounded, its edge slightly detached and very entire, and its surface somewhat uneven and porous. The suprascapular region is marked out by a patch of scales of smaller size than those of the body. The lateral line is traced on the fourth row of scales, taking into the reckoning the row of smaller scales which forms the wall of the groove in which the dorsal stands. It runs parallel to the curve of the back until near the end of the dorsal, when it gradually assumes a straight course through the tail. Thirty scales enter into its composition, and the arbuscle on the disc of each consists anteriorly of six branches, mostly inclining upwards and seldom divided: posteriorly the branches are fewer, and near the caudal fin the line is formed by a straight tube almost continuous from scale to scale, and having a few very short and slender branchlets diverging from it upwards and downwards at right angles. This composition of the lateral line is much like that of *Cossyphus schenleinii* of Agassiz (C. and V. xiii. p. 143), which further nearly agrees with our fish as well as with *Labrus macrodontus* and *L. japonicus* in the numbers of the fin-rays. Short crowded streaks are faintly visible with a lens on the edges of the scales, and similar striæ are more plainly seen towards the bases of the uncovered discs of the paler scales on the lower parts of the body.

RAYS:—B. 6; D. 13|7; A. 3|10; C. 12 $\frac{3}{4}$; P. 15; V. 1|5.

Though the normal number of gill-rays of the *Labri* be only five, the specimen here described, which consists of the right side of the fish, has six that can be reckoned without risk of mistake. In the recent fish the gill-membrane must be greatly concealed by the dilated interoperculum. The spinous rays of the dorsal, anal and ventral fins are all moderately strong and pungent. The dorsal ones are overtopped by small membranous processes; the height of the fin augments gradually up to the penultimate branched ray, which is the tallest, and forms an acute though not slender point, the last ray being deeply divided and rounding it off behind: the first spine has one-third of the length of the tallest jointed ray. The form of the anal resembles that of the dorsal: its third spine is the strongest of

the three, and is twice the height of its first one. The ventral spine is more slender, and is one-third shorter than the soft acute point of the fin, which reaches nearly to the vent. The caudal fin forms one-sixth of the total length of the fish, and is moderately and somewhat irregularly rounded; its upper corner being acute and rather longer than the under one.

The original colours of the specimen have disappeared, but the distribution of some of the darker tints may still be made out. The top and sides of the head have a dark brownish hue, which is separated from the inferior orange or reddish yellow parts by an even line running from the corner of the mouth beneath the angle of the preoperculum and pectoral fin. There is a purplish brown patch on the chin. The light tints of the under surface rise in the axilla of the pectoral to the middle of the side, and are continued at that height to the caudal. The upper parts have in the dried fish a not very uniform leaden hue. Three broad dark bars descend from the spinous part of the dorsal to the lateral line; there is a fourth before the fin, and a fifth more obscurely seen at the end of the soft part. The intermediate paler spaces are narrower than the bars. All the fins have a yellowish tint, except the three upper pectoral rays, which have the dark hue of the dorsal bands. There are no markings on the dorsal, though the colour of the spinous part is somewhat deeper than that of the soft part. Two diaphanous lines traverse the middle of the anal, and five similar ones cross the caudal, followed by dots on the end of the fin.

DIMENSIONS.		inches.	lines.
Length from front teeth to tip of the caudal fin	10	0	
———— base of ditto	8	8	
———— vent.....	4	11	
———— ventrals	3	3	
———— dorsal	3	2½	
———— pectoral	3	0	
———— tip of gill-cover	2	11	
———— edge of orbit	1	5	
Diameter of orbit	0	6½	
Length of pectorals	2	4	
———— ventrals	1	6	
Height of body	3	0	
———— trunk of tail	1	0	

LABRUS ? IRIS (Solander), Rainbow Labroid.

Labrus ? iris *, Solander, Pisc. Nov. Holl.

This fish was obtained on Cook's first voyage to the coast of New Holland, off Bustard Bay, in the 24th parallel of south latitude and 208½° meridian. Solander has not furnished us with the means of ascertaining its proper genus, and we quote his description chiefly to excite the attention of collectors who

* *Labrus iris* of Lacepède is a *Centrarchus*, and is identical with his *Labrus macropterus*.

may visit that part of Australia. Judging from the splendour of its dress, we may suspect it to be a *Julis*. It will be readily recognised by the extreme length of its upper caudal ray.

“*Labrus iris*, Majj 24, 1770. Dorsum pallide olivaceum, infra medium e cærulescenti albidum. Vitta in medio quadruplex, α . superne lutescens, β . pallide cyanea, γ . lutescens, δ . griseo-cærulescens. Supra os fasciæ tres splendidæ, α . intense cærulea, β . flava, γ . —. Capitis latera pallide cærulescentia ad pinnas pectorales ducta. Vittæ cæruleæ per iridem continuantur. Obs. Vitta lateralis postice cyanea, ad basin pinnæ caudalis arcuata et inferne reflexa. Pinna caudalis rubescens, subpellucida; dorsalis lutescens; pinnæ pectorales e corneo albidæ, pellucidæ; ventrales et pinna ani albido-pellucidæ. Obs. Radius supremus pinnæ caudalis elongatus, ut cauda triplo longior.” (Solander.)

TAUTOGA MELAPTERUS (Cuv. et Val.), The Ardilga.

Tautoga melapterus, Cuv. et Val. xiii. p. 311.

Labrus melampterus, Bl. 285. Schn. 247.

No. 19. Mr. Gilbert's list.

The ‘Ardilga’ of the natives of Port Essington inhabits deep water among sunken rocks, and readily takes a baited hook. Mr. Gilbert's specimen was captured at the Tamar rock. It agrees so closely with the account of the large-lipped *Tautoga* from the sea of Java, in the ‘*Histoire des Poissons*,’ that I have no hesitation in considering it to be the same species. A few particulars which are more readily observed in the dried skin than in a specimen preserved in spirits are mentioned in the following notice.

The plaits of the large upper lips and the lobes of the lower one preserve their form when dried. The cranium above the posterior angle of the orbit and the suborbitars show many undulating and anastomosing lines, producing an irregular rustic-work; the upper limb of the preoperculum is more faintly marked in the same way; and the operculum is sculptured in fine straight lines, radiating from its upper corner. There are two rows of scales on the cheek deeply imbedded in the skin, and a single vertical row containing five on the temple. The lateral line is composed of twenty-seven scales, each having on its disc a tapering tube with the point inclined upwards. The exposed discs of all the scales on the body are impressed by upwards of twenty faint fan-like streaks, which are continued over the thin membranous edges.

RAYS:—B. 5; D. 9|10; A. 2|10; C. 13 $\frac{3}{4}$; P. 13; V. 1|5.

The pectorals are rounded; the dorsal and anal fins end in acute points. The dorsal contains an articulated ray fewer than the specimen belonging to the Leyden Museum, which is the one described in the ‘*Histoire des Poissons*.’ The posterior rays of the fin are one-fifth longer than the first soft ray, and twice as high as the first spine. The other spines increase gradually in height, the ninth being just perceptibly shorter than the jointed ray which succeeds

it. The anal contains only two spines, unless the anterior short one has been removed in preparing the specimen. The pointed ventral reaches to the anus. The margin of the caudal is slightly concave, the angles rather acute, and the upper one projecting a very little.

The colours of the specimen are tolerably well preserved, and agree generally with the tints mentioned in the 'Histoire des Poissons.'

The scales of the back and sides are dark and show greenish tints, and each is sharply bordered by a dark purplish margin producing a regular meshwork: there are faint traces of a paler crescent on each scale within the marginal one. The under surface of the body, bounded by a line running from the axilla of the pectoral to the anal, is pale, each scale having also a pale margin, though of a different tint from the disc. There is a large circular violet-purple blotch behind the eye, a dark patch on the preorbital, and some spots of campanula-purple on the preoperculum, suboperculum and interoperculum. The cheeks and operculum have a dull yellowish hue. The colours of the pectorals and ventrals are effaced, except that a dark mark remains on the base of the former. The dorsal and anal fins are imperial purple, which is bounded by a line of deep pansy-purple, the extreme border being pale. Many dots of pansy-purple are spread over both fins, being roundish on the anal and oblong on the soft dorsal; a few larger drops extend to the pale border of the anal, and the scales on the base of the fins are edged with emerald-green. The caudal is purplish without spots, its edge being pale.

DIMENSIONS.		inches.	lines.
Length from upper teeth to end of caudal	13	6	
base of caudal	11	3	
anus	6	9	
dorsal	4	9½	
ventrals.....	4	6	
pectorals	4	2	
end of lobe of gill-cover	4	3	
orbit	2	3	
Diameter of eye	0	7	
Height of body	3	6	

[To be continued.]

L.—*Observations on the Growth, Reproduction, and Species of the Branched Freshwater Confervæ*. By ARTHUR HILL HASSALL, Esq.

In a paper read before the Natural History Society of Dublin, a portion of which was inserted in the 'Annals,' vol. ix. p. 431. allusion was made to the principal mode of growth of the freshwater *Confervæ*, viz. by the continued growth and bi-section of all the cells entering into the formation of the filaments. I come now to notice a second mode of development,